

ABSTRACT

A magnetic tunneling junction (MTJ) memory cell and an MRAM array of such cells, is shielded by magnetic shields of ferromagnetic material or by ferromagnetic shields that are stabilized by patterned layers of antiferromagnetic material or permanent magnetic material. The ferromagnetic portions of the shields surround the MTJ cells substantially conformally and thereby can compensate the poles of the free layers of MTJ cells of various geometric cross-sectional shapes and also protect the cells from the adverse effects of extraneous fields. The additional antiferromagnetic and permanent magnetic materials stabilize the shields by exchange or direct coupling.